

Installing a Toilet

It's mostly in the flange

by George Skaates

Plumbing fixtures like sinks and toilets are among the last items to be installed in a bathroom. By the time the room is ready for them, the finished counters are atop their cabinets, the floors are down and the baseboards and walls are painted. Ordinarily, there is an extra measure of satisfaction for a plumber as these fixtures are put in place because they signal the end of the job. I say ordinarily because if the drain and supply lines aren't in the right place for these fixtures, this last phase can be a nightmare for the plumber—especially if the toilet connections are misplaced. With a lavatory, the hookups are usually made inside a cabinet, and adjustments are hidden from view. But it's hard to hide a toilet that is too far from the wall or off center in its bay because the flange was carelessly affixed to the subfloor in the wrong place. And if the position of the water supply isn't correct for the type of toilet that's being installed, you might have to tear out part of a finished wall in order to make things fit.

Layout—Most toilets are roughed in at 12 in. from the finished wall. This means that the centerline of the closet flange, the fitting to which the toilet is attached, should be 12 in. from whatever wall surface will eventually cover the framing behind the toilet. Since most houses are finished with ½-in. drywall, the centerline of the flange ends up 12 ½ in. from the framing. If the wall surface is to be thicker, for instance a layer of drywall followed by mortar and tile, you have to allow for the additional thickness as you position the closet flange. Finished walls to the side of the toilet should be at least 15 in. away from the centerline of the closet flange.

All is not lost if you put the flange a bit too close or too far from the back wall. Toilets are available for 10-in. and 14-in. flange positions. But like other oddball orders, you pay a premium for these special fixtures.

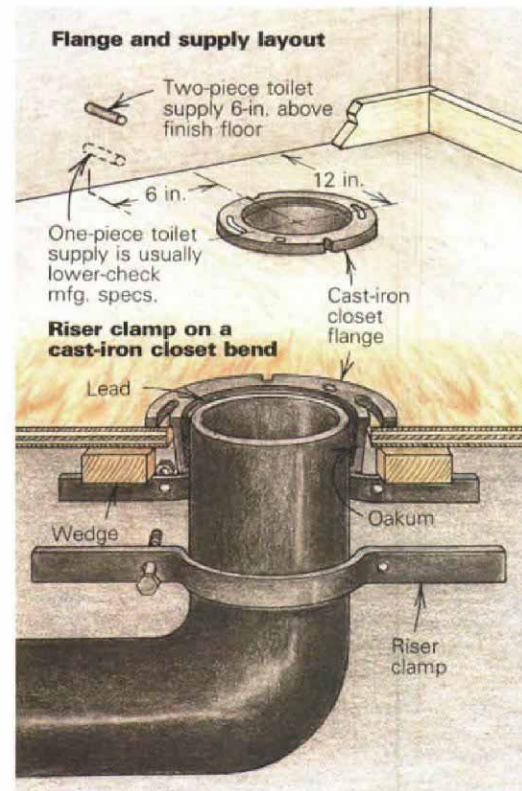
The water supply for most toilets should leave the wall about 6 in. to the left of the center of the closet flange and about 6 in.

above the level of the finished floor (drawing below). This position is correct for all the two-piece toilets (where the tank and bowl are separate) I've ever installed, but not for the one-piece, integral tank-and-bowl toilets known as lowboys. They need a supply line about 2 ½ in. to 3 in. above the floor. If you are at all in doubt about the supply-line and flange positions for a toilet, check the manufacturer's spec sheet for the location.

Closet-bend anchorage—When I rough in the drain for the toilet, I make sure the closet bend is secured to the framing with strapping (photo 1). The importance of this step cannot be overemphasized. If you ignore it, the coupling between the toilet and the drain line will flex over a period of time, and that will lead to a broken seal. Eventually the toilet will leak. To anchor cast-iron drain systems, our crew uses 20-ga. galvanized steel strapping called band iron. Most often, I'll place a 2x4 block under the closet bend to



1. In wood-frame construction, a closet bend should be supported from below with a 2x4 block and held in place with strapping.



provide solid bearing and a place to attach the band iron.

If the floor construction is such that I can't easily install a block, I'll use a riser clamp on a cast-iron drain. A riser clamp is composed of two steel bars. Each one is deformed in the middle to form a U-shaped cradle. In use, the bars are bolted together to encircle the pipe near the point where the closet bend passes through the subfloor. As shown in the drawing (left), the riser clamp should be far enough away from the subfloor to allow room for the closet flange. Wedges driven between the subfloor and the riser clamp complete the assembly.

Plastic closet bends should be secured with plastic strapping. Don't use steel strapping for this as the constant expansion and contraction of the plastic pipes will work the fitting against the steel straps' sharp edges.

Another way to anchor a plastic closet bend is with a fitting called a Stay Put Stabilizer (drawing below). Made by Specialty Products Company (P.O. Box 186, Stanton, Calif. 90631), the stabilizer is cemented to the closet bend, then nailed through the flange and into the subfloor.

For eliminating closet-bend movement in slab floors, Specialty Products makes another stabilizer that is installed prior to the pour (drawing below). On slabs, you've got to wrap the pipe stub where it emerges from the concrete to allow room for the closet flange. This goes for plastic or cast iron. I use Flexwrap for this (Cal Western Supply, 1111A East Houston, Visalia, Calif. 93291). It is a pliable foam, about 1/8-in. thick, that comes in 8-in. wide rolls. I build it up around the pipe until I've got

a layer 5/8-in. or so thick. When the foam is removed after the slab has cured, I've got the necessary cavity to accept the flange.

Flange to plastic drain line—About two-thirds of my customers want plastic drain lines—the others ask for cast iron. With plastic pipe, the flange is installed after the pipe stub protruding above the level of the floor has been trimmed (photo 2). For this operation, I use a flexible handsaw made just for cutting plastic pipe. It bends enough to make a cut that's flush with the level of the floor.

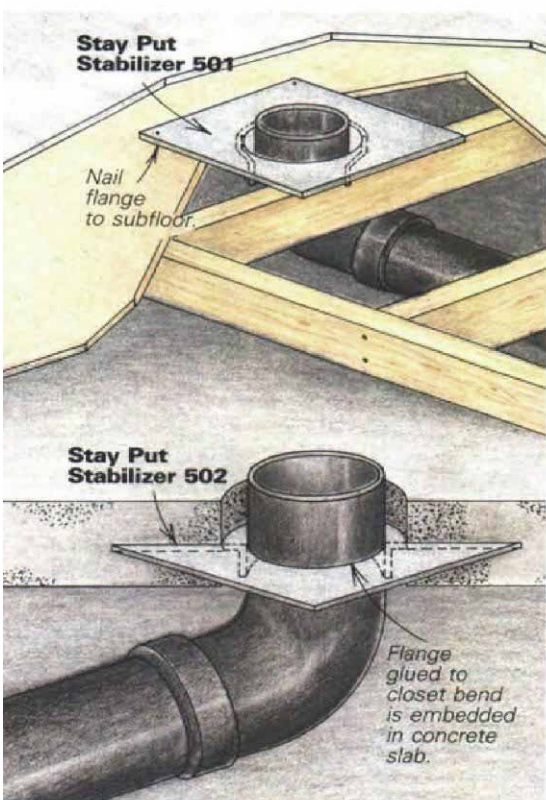
A closet flange for a plastic drain line has a plastic collar coupled with a painted steel ring that bears on the floor (photo 3). The collar fits over the pipe stub, and once the fit is right, it is glued to the stub with the same solvent-type cement used to assemble the pipes and their fittings. When a floor has been tiled (or, as in this case, covered with marble), tilesetters will sometimes let their

mortar and thinset get a little too close to the pipe to allow room for the flange. If this happens, bust out a groove for the flange with a cold chisel, or use a reciprocating saw with a masonry blade to cut a channel (photo 4).

Once you've got the flange cemented to the stub, secure the ring with galvanized screws. Use a masonry bit to drill through any tile between the ring and the substrate. If I'm affixing the ring to a slab floor, I will use concrete screws or lag screws driven into plastic shields.

A closet flange for plastic drain pipe has a pair of slots in the metal ring that accept closet bolts (photo 5). The slots allow the bolts, which have T-shaped heads, to be slid around for adjustment.

Flange to cast-iron drain line—A cast-iron closet flange is a beefier version of the one used for plastic drains, and it has slots and a pair of notches for locating the closet bolts. I



2. Before installing a closet flange, cut the plastic pipe flush with the floor.



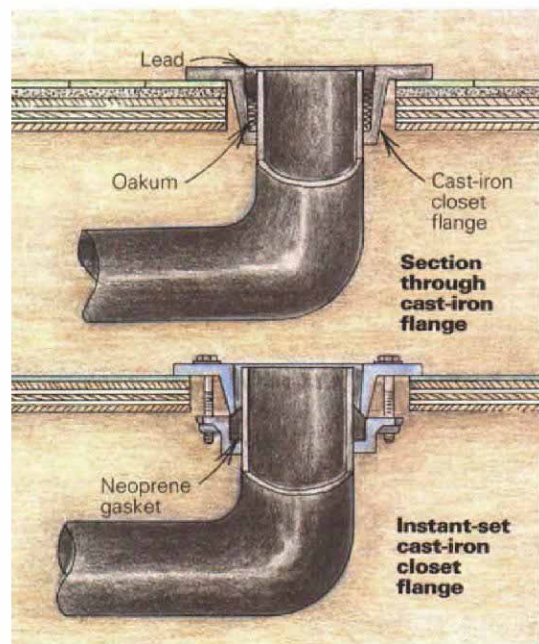
4. Sometimes tile or stone floor coverings will crowd the pipe stub, making it difficult to install the closet flange. When this happens, use a cold chisel or a reciprocating saw to make room for the flange.



3. Slots in the steel ring of a closet flange accept closet bolts. They will protrude through holes in the base of the toilet.



5. Closet bolts are made of brass and have machine threads and a T-shaped head. The head fits into the slot in the flange ring, and the bolt slides into position. Then, the head is turned 90°, and the bolt is tightened in place.



6. Skaates uses a yarning iron to push the oakum into the space between the cast iron closet flange and the drain. Next he will use a packing iron (the right-hand tool in the trio above) to press it home.



7. A bent-handled ladle, anchored by a box full of pipe nipples, makes a handy basin in which to catch molten lead.

don't use the slots because the iron is very thin at this point in the casting, and I've seen it break under the stress of tightening the closet bolts. Stick with the notches and you'll avoid this problem.

Unlike the installation of a closet flange in a plastic drain system, you trim the cast-iron stub after the flange has been installed. The flange hub, which is slightly tapered, fits over the pipe, leaving a gap of about $\frac{1}{4}$ in. all the way around (above drawing). I make the seal between the two with lead and oakum.

Oakum is a sticky material made of hemp fibers that have been treated with tar. Plumbers use yarning irons and packing irons to stuff the oakum into the space between the closet flange and the drain (photo 6). I pack the oakum down until there is a space about 1 in. deep for the lead.

I have a small acetylene torch that I use for sweat-soldering copper pipes. It also comes in handy for melting lead for small jobs like this. Holding a lead ingot with a pair of pliers, I can fill a ladle in a hurry by heating the side of the ingot (photo 7). A word of caution: If you need to melt lead in quantity with a setup like a cast-iron pot atop a burner, don't add cold or wet pieces of lead to a batch that has already melted. To do so runs the risk of a nasty explosion that can send molten lead flying through the air.

When I've got enough molten lead, I use my ladle to pour it into the joint between the flange and the drain line (photo 8). When it hits the cold iron, it sets up immediately, shrinking slightly in the process. To make up for the shrinkage, the lead has to be driven downward slightly with caulking irons. Caulking irons resemble cold chisels, but they have blunt, radiused ends matching the curvature of the pipe and the fitting. I use one iron to set the outside edge of the lead (photo 9), and another to tap home the inside edge where it meets the drain line. This

isn't a bone-crusher operation—a couple of light taps in each spot will do, but be sure to cover the entire surface of the lead.

I finish up a cast-iron closet-flange installation by trimming off any excess drain line with an internal pipe cutter, (photo 10) which scores the inside of the pipe until it snaps. If you don't have access to one of these cutters, use a grinder to cut a shallow groove around the outside of the drainpipe where it meets the flange. Then use a crescent wrench as a lever to bust off the unwanted stub. Clean up the ragged edges with a grinder (make sure to protect the walls), and you're ready to screw the flange to the floor.

While a closet flange for a plastic drain will likely have half a dozen screw holes in the steel ring, a cast-iron flange has only two. This is because of the inherent rigidity of a cast-iron system. If you've got the cast-iron closet bend secured, a properly installed flange isn't going to move either, so a couple of screws into the subfloor will anchor it.

An alternative to the leaded-flange installation for cast iron is a device called the instant-set flange. It is a two-piece casting that sandwiches a neoprene gasket between the drainpipe and a metal collar (above drawing). As you tighten the four bolts, the gasket swells to create a seal. Instant-set seals install quickly, but don't work any better than the leaded variety and they cost much more. Consequently, I don't use them. But for those lacking the tools for working with lead and oakum, they can be worth the extra money.

Installing the toilet—The toilet's outlet is connected to the closet flange by way of a wax and plastic gasket (photo 11). The plastic portion of the gasket is a funnel that fits into the the drainpipe. The wax, which is soft and sticky, conforms to the spigot as the toilet is positioned. Some plumbers will press the wax onto the spigot, then lower the toilet

onto the closet flange. I prefer to set the wax gasket in the flange and lower the toilet onto it. Either method works fine.

Once you've got the closet bolts through the holes in the base of the toilet, gently rock the bowl back and forth until it comes in complete contact with the floor. Then use the nuts and washers supplied with the closet bolts to secure the bowl to the floor. Tighten them very carefully—the toilet is porcelain, and you can break it with too much torque.

If you are installing a two-piece toilet, insert the bolts through the bottom of the tank and place all washers in their respective positions (photo 12). Set the tank on the bowl, making sure the bolts go through the corresponding holes on the bowl. Now carefully tighten the nuts, alternating between bolts to spread out the compression, until the tank



11. The transition between the toilet outlet and the closet flange is made with a wax and plastic gasket.



8. With the oakum in place, the gap between the drain and the flange is filled with lead.



9. The hardened ring of lead is packed into the joint with a caulking iron.



10. An internal pipe cutter will quickly trim a cast-iron stub to the desired length.

comes in contact with the bowl. This prevents the tank from moving around.

Now that the toilet is in place, you can connect the water. The chances are that the supply tube coming out of the wall is encrusted with paint. Use the escutcheon plate to scrape it off by installing the plate backwards, then moving it in and out until the tube is clean. The supply-tube stub will have to be trimmed back to about 1 1/2 in.

A compression-fit valve called an angle stop fits over the supply stub. I connect the valve to the tank with 3/8-in. rigid copper supply tube designed for toilets (photo 13). It makes a clean installation accepted by every plumbing inspector I've ever met. To bend the tube, I use a tool made for the job (Ridge Tool Co., 400 Clark St., Elyria, Oh. 44036-2023). But some supply tubes are easier to

install—especially the new flexible stainless steel hoses. Before your inspector nixes one, make sure they're legal in your area.

When the water has been connected, retighten the nuts, if necessary, that secure the bowl to the floor, trim the bolts with a hacksaw and snap the plastic bolt caps in place. The installation is complete. Turn the angle stop on and fill the tank.

Flange too low?—Regardless of whether you're working with plastic or cast iron, the closet flange is supposed to end up atop the finished floor surface (photo 3). But they often don't. Sometimes they are even with the floor, and sometimes below it. Why? Because people change their minds and decide on different floor finishes. For instance, the floor in photo 14 was to be vinyl, but the clients

decided to put in marble instead. The thickness of the mortar and the marble put the flange about an inch below the finished floor. This can create a problem because the toilet spigot won't fully engage the wax ring, which means a leak. In this situation, cut the wax portion away from a second gasket and stack it on top of the gasket already in place. The added wax should make up for the low position of the closet flange.

Finally, caulk the toilet to the floor. I use a bead of DAP tub and tile seal all around the base of the toilet where it meets the floor. It prevents the accumulation of noxious grunge and prevents roaches from taking up residence under the toilet. □

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12. Two-piece, or close-coupled, toilets have separate bowls and tanks that must be bolted together carefully.



13. Skaates uses a tubing bender to shape the supply tube leading from the angle stop valve (lower left) to the toilet tank.



14. The closet flange should end up atop the finished floor surface, but it doesn't always work out that way. In the installation shown here, another wax ring has been added to the gasket to make up the difference.